OPTN | UNOS

Public Comment Proposal

Review of HLA Tables (2016)

OPTN/UNOS HistocompatibilityCommittee

Contents

Review of HLA Tables (2016)

Affected Policies:　　　　　*Policy 4.10: Reference Tables of HLA Antigen Values and Split Equivalences*
Sponsoring Committee:　　*Histocompatibility*
Public Comment Period:　　*July 31, 2017 – October 02, 2017*

Executive Summary

The Histocompatibility Committee (the Committee) is charged with reviewing the equivalency tables in *Policy 4.10: Reference Tables of HLA Antigen Values and Split Equivalences* and recommending any updates as needed. During the 2016-2017 review of the equivalency tables, the Committee identified a need to include HLA-DPB1 equivalences in policy. The Committee created a DPB1 unacceptable antigen equivalency table that includes G allele equivalences, and also made updates the existing tables to reflect advancements in HLA testing since the last comprehensive update. This proposal also updates the nomenclature in all equivalency tables in policy. By updating the equivalency tables, members have a current resource to use when performing and interpreting final crossmatches and considering organ offers. For candidates with antibodies to newly added antigens, these updates can help improve graft survival. The table updates in this proposal will provide members with new antigen equivalences that can help them make more informed transplantation decisions.

Is the sponsoring Committee requesting specific feedback or input about the proposal?

The Committee is looking for feedback on the inclusion of HLA-DPB1 G alleles in Table 4-14: *HLA DPB1 Unacceptable Antigen Equivalences*. Specifically, the Committee would like to hear from the community about the relevance and importance of including DPB1 G alleles in an equivalency table. The Committee also welcomes the opportunity for any feedback on the changes to the equivalency tables.

What problem will this proposal address?

Policy 4.9: HLA Antigen Values and Split Equivalences requires the Histocompatibility Committee (the Committee) to review the HLA equivalency tables on an annual basis and recommend any changes needed. The most recent comprehensive update to the tables was approved in December 2015.[1] During the 2016-2017 review, the Committee identified a potential need to include an HLA-DPB1 equivalency table as part of the annual update.

The presence of HLA-DP donor specific antibodies can affect graft survival, organ allocation, and patient safety. Research shows the prevalence of DPB1 in highly sensitized candidates; in one study among candidates with CPRA greater than 98%, well over 50% possess DPB1 antibodies.[2] As of November 2014, UNOS added DPB1 to the match-run algorithm, allowing DPB1 antigens to be listed as unacceptable.[3] Though this is helpful for members when choosing DPB1 antigens that are only equivalent to themselves (that is, a donor and candidate both have a DPB1 antigen that is only equivalent to itself), members are unable to choose DPB1 antigens that are equivalent to several antigens, and then have all those equivalent antigens screen off. This shortcoming could result in inappropriate organ allocation, unexpected positive crossmatches, increased cold ischemia time, and the potential for transplanting incompatible organs. In order to provide better correlation between DPB1 types and DPB1 unacceptable antigens, the Committee proposes the creation of an equivalency table showing the relationships between DPB1 alleles, specifically the G alleles. These relationships could then be applied to the match-run algorithm to help ensure appropriate organ allocation.

Part of this proposal updates the HLA nomenclature in the equivalency tables to better align the tables in policy with language used in the HLA community. This can help improve member usability and understanding of the content in the tables.

Why should you support this proposal?

Updates to the equivalency tables provide members with more detailed HLA equivalences that reflect changes and advancements in HLA testing. In order for members to make more informed decisions when accepting an organ, it is important that the equivalency tables reflect the most current equivalences available and that the tables are updated frequently. This proposal adds many new antigens and alleles to the equivalency tables, giving transplant professionals more information that could reduce the risk of organ rejection from previously unlisted antibodies.

The addition of the HLA-DPB1 table will allow for better assessment of compatibility for individuals with DPB1 antibodies. This will permit more efficient organ allocation, decrease the likelihood of an unexpected positive physical crossmatch, and decrease the likelihood of an incompatible transplant.

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[1] OPTN/UNOS Policy Notice. *Update to the Human Leukocyte Antigens (HLA) Equivalency Tables.* Accessed July 12, 2017. https://optn.transplant.hrsa.gov/media/2069/policynotice_20151201_histo_hla.pdf

[2] Bray RA, Gebel HM. The new kidney allocation system (KAS) and the highly sensitized patient: Expect the unexpected. American Journal of Transplantation 2014.

[3] OPTN/UNOS Policy Notice. *Expanding HLA Typing Requirements.* Accessed June 30, 2017. https://optn.transplant.hrsa.gov/media/1282/policynotice_20141201.pdf.

How was this proposal developed?

This project consists of three types of updates to the equivalency tables: the creation of an unacceptable antigen equivalency table for HLA-DPB1, updates to the existing equivalency tables currently in policy, and updates to the HLA nomenclature.

Creation of HLA-DPB1 Table

During the annual review of the equivalency tables, the Committee identified a potential need to add an equivalency table for HLA-DPB1 as part of policy. The Committee formed the DPB1 Subcommittee (the Subcommittee) and tasked the group with evaluating if a DPB1 equivalency table should be included in policy. The Subcommittee grappled with how to create a table that would provide members with the most benefit. The Subcommittee first created a list of problems that the DPB1 equivalency table could potentially ameliorate. Responses included:

- Preventing the misallocation of organs.
- Avoiding doing a crossmatch on patients that would be positive.
- Reducing organ discards by doing virtual typing.
- Developing a system for screening DP in virtual crossmatches.
- Establishing a scenario where a center has an option of selecting a DP as an avoid if they choose to without dictating clinical practice.
- Avoiding unexpected positive crossmatches.

Preventing the misallocation or organs, avoiding positive crossmatches, and reducing organ discards were identified as the main goals for creating the DPB1 equivalency table.

At the time the Subcommittee first met in January of 2016, UNOS released an update to UNet[SM] that added fields for HLA-DQA1 and DPB1. Though these fields would be helpful for members to select certain DQA1 and DPB1 unacceptable antigens for candidates and donors, the Subcommittee felt it was important to create a DPB1 equivalency table for those alleles that did only have a one-to-one equivalent relationship.

When exploring different ways to include a DPB1 table in policy, the Subcommittee considered a range of options. There were concerns that a table similar to those in policy for other HLA loci such as HLA-A, B, C, and DR would not work for DPB1 because of the complexity of the DPB1 locus. The Subcommittee considered creating mapping to specific epitopes as a resource for members as well as other epitope modeling for the DPB1 table. As the Subcommittee reviewed the literature and considered how to create the DPB1 table, they began to consider that this effort would be better defined as developing a tool for DPB1 rather than a table, since the tool would function differently than the equivalency tables. The Subcommittee also considered mapping amino acids sequences for DPB1 that would function within the DPB1 tool.

The Subcommittee then explored the idea of using common epitope groups within the existing equivalency table structure. This model would allow members to be able to select a particular DPB1 epitope, such as DEAV, as unacceptable. UNet would then eliminate all antigens that are part of that epitope group. This option could either display all antigens that are part of that epitope group in the unacceptable antigens box as they are typically displayed, or the system could be programmed to know what antigens are part of the epitope and by selecting the epitope all antigens in the group would automatically be marked as avoids during the matching process even though they do not appear in the unacceptable antigen box individually. The Subcommittee decided to move forward with this idea and worked on reviewing the literature to confirm which epitopes were supported by research to include in the modelling.

In order to make this project more manageable, the Subcommittee later agreed to split the project into several possible phases.

- Phase 1: List DPB1 G alleles as equivalent
- Phase 2: List epitype matched alleles
- Phase 3: Provide software as an aid in assessment

Phase 1 fell under the scope of the approved project, and the Subcommittee will consider Phases 2 and 3 for future projects.

Phase 1: List DPB1 G alleles as equivalent

Since most of the DPB1 alleles are in UNet already from the Expanding HLA Typing Requirements project implemented in January 2016, the Subcommittee identified that the list in UNet would need to be updated to reflect the most recent alleles available from the International ImMunoGeneTics Information System (IMGT).[4] UNOS IT confirmed that this G allele DPB1 table would be implemented similarly to the other equivalency tables, making it an easier IT implementation effort than creating an entirely new type of equivalency table or tool as previously considered by the Subcommittee. These alleles could be updated regularly, with the anticipation that there will not be many new alleles to add each year. The discrepancy reports reviewed by the Discrepant HLA Typing Subcommittee showed that labs were being flagged for entering G alleles for certain antigens because these alleles are not currently in the UNet system; this shows a need in the community for the equivalency tables to reflect advancements in the field.

Phase 2: List epitype matched alleles

The second phase would be to list DPB1 epitypes. The Subcommittee will research and discuss which epitopes to include in policy. The Subcommittee emphasized the need for any epitype method they create to be usable by all types of labs and centers, and to allow for flexibility in practice.

Phase 3: Provide software as aid in assessment

The third phase of incorporating DPB1 into policy would be to create a software tool to help members in their assessment of DPB1 antigens. Similar to an existing web based prototype that does epitype matching, the Subcommittee considered having UNOS create a web based application to help members better interpret DPB1 antigens and aid in decision making. As this is the third phase, the Subcommittee will discuss this phase in more detail as a possible future enhancement.

Updates to Existing Equivalency Tables

Along with the creation of the DPB1 table, the Subcommittee updated the existing equivalency tables in policy. These regular updates are important to the community for several reasons. With the implementation of the new kidney allocation system (KAS), kidneys are being shared more broadly and laboratories may have less time to run perform crossmatching. With the use of virtual crossmatching, members may rely more heavily on the equivalency tables for identifying potential positive crossmatches. Additionally, updates to the HLA-A, B, and DR matching antigen equivalency tables increases fairness for those with newly listed antigens, as they receive points as part of KAS for being a 0-ABDR mismatch. Updates to the unacceptable antigen equivalency tables show the ongoing advancements in the understanding of unacceptable antigen relationships, which could impact graft survival.

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[4] *See* http://www.imgt.org/ (Last accessed 6/23/2017).

The Subcommittee used the data that accompanies the test kits to identify what new alleles are detectable by the bead-based assays.[5][6][7][8][9][10] Any alleles in the lab reports that were not in the current OPTN/UNOS equivalency tables, were added to the equivalency tables. The Subcommittee considered the alleles that are no longer detectable with current test kits. Generally speaking, the Subcommittee chose to remove these alleles from the equivalency tables; however, they chose to keep HLA-B 08:04 in the tables for historical purposes. Though it is no longer detectable, it will prevent the need for contacting members to change their data if B 08:04 was removed from the equivalency tables.

Updates to HLA Nomenclature

In order to make the tables more in line with current HLA nomenclature, the Committee added colons for all specific alleles and a zero in front of single digit allele groups with specific alleles. This change will make the antigens easier to read when members are interpreting the contents of the equivalency tables. An example is shown below in Figure 1: Addition of Colons and Zeroes to Equivalency Tables.

Figure 1: Addition of Colons and Zeroes to Equivalency Tables

Table 4-2: HLA A Matching Antigen Equivalences

Candidate A-Locus Antigen	Equivalent Donor Antigens
1	1, 01:01, 01:02
01:01	01:01, 1
01:02	01:02, 1

Candidate A-Locus Antigen	Equivalent Donor Antigens
2	2, 02:01, 02:02, 02:03, 02:05,

Candidate A-Locus Antigen	Equivalent Donor Antigens
02:02	02:02, 2
02:03	02:03, 2
02:05	02:05, 2
02:06	02:06, 2

How well does this proposal address the problem statement?

Creating a new equivalency table for HLA-DPB1 gives members more HLA information to use when performing crossmatches and considering organ offers. This benefits those candidates with DPB1 antigens that are equivalent to other DPB1 antigens, like the newly added G alleles. By adding this table and updating the existing tables, members will have more current HLA information that reflects advancements in the histocompatibility field.

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[5]

Immucor. 2016. "LIFECODES LSA™ Class I." Accessed June 23, 2017. http://www.immucor.com/LIFECODES%20Documents/LC980-NEW.14%20-%20LIFECODES%20LSA%20Class%20I%20Worksheet%20Lot%2011116A-RUO.pdf;

[6] Immucor. 2016. "LIFECODES LSA™ Class I." Accessed June 23, 2017. http://www.immucor.com/LIFECODES%20Documents/LC1689%201%20-%20LIFECODES%20LSA%20Class%20II%20Worksheet%20Lot%2011236A-RUO%20(2017-11-30).pdf

[7] One Lambda. "LABScreen® Single Antigen HLA Class I Antibody Detection Test". Accessed June 1, 2017. http://www.onelambda.com/content/dam/onelambda/en/TDX/Documents/securedocs/docs/Work_Sheet/LS1A04_010_WS.pdf

[8] One Lambda. "LABScreen® Single Antigen HLA Class II – Group 1, Lot 012". Accessed June 1, 2017. http://www.onelambda.com/content/dam/onelambda/en/TDX/Documents/securedocs/docs/Work_Sheet/LS2A01_012_WS.pdf

[9] One Lambda. "LABScreen® Single Antigen HLA Class I Supplement – Group 1, Lot 003". Accessed June 1, 2017. http://www.onelambda.com/content/dam/onelambda/en/TDX/Documents/securedocs/docs/Work_Sheet/LS1ASP01_003_WS.pdf

[10] One Lambda. "LABScreen® Single Antigen HLA Class II Supplement – Group 1, Lot 002". Accessed June 1, 2017. http://www.onelambda.com/content/dam/onelambda/en/TDX/Documents/securedocs/docs/Work_Sheet/LS2ASP01_002_WS.pdf

Which populations are impacted by this proposal?

This proposal will expand the number of antigens listed in policy. By providing members with more relationships between antigens, transplant professionals will be better able to match candidates with donors. Since more antigen relationships have been identified and testing kits can now test for different known alleles, more recipients can benefit from more robust tables. These updates can potentially improve outcomes for candidates who have antibodies to the newly added antigens. Though members have been able to select DPB1 antigens in UNet before this proposal, the added G alleles will give members more information about allele level relationships that could impact crossmatches.

How does this proposal impact the OPTN Strategic Plan?

1. *Increase the number of transplants*: The updates to the equivalency tables will provide members with more detailed equivalences to better inform transplantation decisions. This could increase the number of organ offers and transplants.
2. *Improve equity in access to transplants*: The addition of this table will help ensure that patients are not passed over due to ambiguities in HLA-DPB1 typing. By adding a DPB1 unacceptable equivalency table, members will be more informed about what G alleles are equivalent to other DPB1 antigens.
3. *Improve waitlisted patient, living donor, and transplant recipient outcomes*: The addition of this table will improve outcomes by providing members with more allele specific equivalences, which will improve organ survival especially for sensitized candidates. This is the primary goal for this proposal.
4. *Promote living donor and transplant recipient safety*: By providing members with updated equivalency tables, members will be able to identify more antigens that could lead to organ rejection.
5. *Promote the efficient management of the OPTN*: Having more equivalences in policy may reduce the number of tests that a lab needs to run. By increasing the number of equivalences in the tables, labs will have more information at their disposal when interpreting test results.

How will the OPTN implement this proposal?

This proposal will require additional programming in UNet. IT will add the new antigens into UNet following the typical programming procedures for equivalency table updates. This proposal will not change monitoring plans for Member Quality. In order to educate the community on the nomenclature changes to the tables, there may be some education and communication needed to make the transplant community aware of the changes. Though the histocompatibility community is largely familiar with the nomenclature already, education and communication may be beneficial.

How will members implement this proposal?

Members will implement this proposal as they have with past equivalency table updates. Labs and centers will need to be aware of the additional alleles listed in the tables, as well as any that were taken out due to no longer being detectable. Members will also need to become familiar with the changes in nomenclature when reporting antigens for candidates and donors.

Transplant Hospitals

Transplant hospitals will need to be aware of the changes in nomenclature. This may involve some brief education with their team members.

OPOs

OPOs will follow normal implementation procedures for the equivalency tables. Personnel will need to be aware of the changes to the tables, including the updated nomenclature. For OPOs that use third party

vendors to input HLA information into UNet, their vendors will have to update their programs to reflect the changes in this proposal.

Histocompatibility Laboratories

Labs will need to follow similar implementation procedures as OPOs. Staff will need to review the new equivalency tables. If the lab uses third party vendors, those programs will need to be updated by the vendors.

Will this proposal require members to submit additional data?

No, this proposal does not require additional data collection. Members are currently required to report all of the HLA loci listed in these tables, including HLA-DPB1. This proposal only creates an unacceptable antigen equivalency table for DPB1.

How will members be evaluated for compliance with this proposal?

The proposed language does not change any member compliance requirements, so there will be no need to evaluate member compliance with the proposal.

How will the sponsoring Committee evaluate whether this proposal was successful post implementation?

The Committee will evaluate this proposal one year after implementation by reviewing HLA and unacceptable antigen frequencies for waiting list candidates, donor HLA frequencies, and any other metrics subsequently requested by the committee. Reviewing frequencies one year after the proposal is implemented will provide the Committee with insight into the presence of newly added alleles in the candidate and donor populations. Specifically for HLA-DPB1, the Committee will be able to evaluate the impact of adding a DPB1 unacceptable antigen equivalency table that includes G alleles.

Policy or Bylaws Language

4.10 Reference Tables of HLA Antigen Values and Split Equivalences

Tables 4-2, 4-3, and *4-4* show candidate-donor antigen equivalences and whether they are mismatches. For each candidate antigen, the donor antigens that are not mismatched are listed below. All other combinations are considered mismatches.

Examples of how "Matching Antigen Equivalences" works:

- If the candidate types as B70: only donors that type as B70 are considered matched. Donors typed as B71 or B72 are considered mismatched.
- If the candidate types as B71: only donors that type as B71, or B15:10, or B15:18 are considered matched. Donors typed as B70 are considered mismatched.

Table 4-2: HLA A Matching Antigen Equivalences

Candidate A-Locus Antigen	Equivalent Donor Antigens
1	1, 01:01, 01:02
01:01	01:01, 1
01:02	01:02, 1
2	2, 02:01, 02:02, 02:03, 02:05, 02:06, 02:07, 02:10, 02:18
02:01	02:01, 2
02:02	02:02, 2
02:03	02:03, 2
02:05	02:05, 2
02:06	02:06, 2
02:07	02:07, 2
02:10	02:10, 2
02:18	02:18. 2
3	3, 03:01, 03:02, 32:04
03:01	03:01, 3
03:02	03:02, 3
9	9
10	10
11	11, 11:01, 11:02
11:01	11:01, 11
11:02	11:02, 11
19	19
23	23
24	24, 24:02, 24:03
24:02	24:02, 24
24:03	24:03, 24
25	25
26	26, 26:01, 26:02, 26:03
26:01	26:01, 26
26:02	26:02, 26

Candidate A-Locus Antigen	Equivalent Donor Antigens
26:03	26:03, 26
28	28
29	29, 29:01, 29:02
29:01	29:01, 29
29:02	29:02, 29
30	30, 30:01, 30:02
30:01	30:01, 30
30:02	30:02, 30
31	31
32	32
32:04	32:04, 3
33	33, 33:01, 33:03
33:01	33:01, 33
33:03	33:03, 33
34	34, 34:01, 34:02
34:01	34:01, 34
34:02	34:02, 34
36	36
43	43
66	66, 66:01, 66:02
66:01	66:01, 66
66:02	66:02, 66
68	68, 68:01, 68:02
68:01	68:01, 68
68:02	68:02, 68
69	69
74	74
80	80

12

13 **Table 4-3: HLA B Matching Antigen Equivalences**

Candidate B-Locus Antigen	Equivalent Donor Antigens
5	5
7	7, 07:02, 07:03, 07:14
07:02	07:02, 7
07:03	07:03, 7
07:14	07:14, 7
8	8, 08:01, 08:02, 08:03, 08:04
08:01	08:01, 8
08:02	08:02, 8
08:03	08:03, 8
08:04	08:04, 8
12	12
13	13, 13:01, 13:02
13:01	13:01, 13

Candidate B-Locus Antigen	Equivalent Donor Antigens
13:02	13:02, 13
14	14
14:01	14:01, 64
14:02	14:02, 65
15	15
15:01	15:01, 62
15:02	15:02, 75
15:03	15:03, 72
15:04	15:04, 62
15:06	15:06, 62
15:07	15:07, 62
15:10	15:10, 71
15:11	15:11, 75
15:12	15:12, 76
15:13	15:13, 77
15:16	15:16, 63
15:17	15:17, 63
15:18	15:18, 71
15:20	15:20, 62
15:21	15:21, 75
15:24	15:24, 62
15:27	15:27, 62
16	16
17	17
18	18
21	21
22	22
27	27, 27:03, 27:04, 27:05, 27:06, 27:08
27:03	27:03, 27
27:04	27:04, 27
27:05	27:05, 27
27:06	27:06, 27
27:08	27:08
35	35, 35:01, 35:02, 35:03 35:08, 35:12
35:01	35:01, 35
35:02	35:02, 35
35:03	35:03, 35
35:08	35:08, 35
35:12	35:12, 35
37	37
38	38, 38:01, 38:02
38:01	38:01, 38
38:02	38:02, 38
39	39, 39:01,-39:02, 39:04, 39:05, 39:06, 39:13
39:01	39:01, 39

Candidate B-Locus Antigen	Equivalent Donor Antigens
39:02	39:02, 39
39:04	39:04, 39
39:05	39:05, 39
39:06	39:06, 39
39:13	39:13, 39
40	40, 4001, 4002, 4006
40:01	40:01, 60, 40
40:02	40:02, 61, 40
40:03	40:03, 61
40:04	40:04, 61
40:05	40:05, 50
40:06	40:06, 61, 40
41	41, 41:01, 41:02
41:01	41:01, 41
41:02	41:02, 41
42	42, 42:01, 42:02
42:01	42:01, 42
42:02	42:02, 42
44	44, 44:02, 44:03
44:02	44:02, 44
44:03	44:03, 44
4415	4415, 45
45	45, 4415, 50:02
46	46
47	47
48	48, 48:01, 48:02
48:01	48:01, 48
48:02	48:02, 48
49	49
50	50, 50:01, 40:05
50:01	50:01, 50
50:02	50:02, 45
51	51, 51:01, 51:02
51:01	51:01, 51
51:02	51:02, 51
52	52
53	53
54	54
55	55, 55:01, 55:02, 55:04
55:01	55:01, 55
55:02	55:02, 55
55:04	55:04, 55
56	56, 56:01, 56:03
56:01	56:01, 56
56:03	56:03, 56

Candidate B-Locus Antigen	Equivalent Donor Antigens
57	57, 57:01, 57:03
57:01	57:01, 57
57:03	57:03, 57
58	58
59	59
60	60, 40:01
61	61, 40:02, 40:03, 40:04, 40:06
62	62, 15:01, 15:04, 15:06, 15:07, 15:20, 15:27
63	63, 15:16, 15:17
64	64, 14:01
65	65, 14:02
67	67
70	70
71	71, 15:10, 15:18
72	72, 15:03
73	73
75	75, 15:02, 15:11, 15:21
76	76, 15:12
77	77, 15:13
78	78
81	81
82	82

14

Table 4-4: HLA DR Matching Antigen Equivalences

Candidate DR-Locus Antigen	Equivalent Donor Antigens
1	1, 01:01, 01:02
01:01	01:01, 1
01:02	01:02, 1
01:03	01:03
2	2
3	3, 03:01, 03:02
03:01	03:01, 17
03:02	03:02, 18
4	4, 04:01, 04:02, 04:03, 04:04, 04:05, 04:06, 04:07, 04:10, 04:11
04:01	04:01, 4
04:02	04:02, 4
04:03	04:03, 4
04:04	04:04, 4
04:05	04:05, 4
04:06	04:06, 4
04:07	04:07, 4
04:10	04:10, 4
04:11	04:11, 4
5	5
6	6
7	7

Candidate DR-Locus Antigen	Equivalent Donor Antigens
8	8, 08:01, 08:02, 08:03, 08:07
08:01	08:01, 8
08:02	08:02, 8
08:03	08:03, 8
08:07	08:07, 8
9	9, 09:01, 09:02
09:01	09:01, 9
09:02	09:02, 9
10	10
11	11, 11:01, 11:04
11:01	11:01, 11
11:04	11:04, 11
12	12, 12:01, 12:02
12:01	12:01, 12
12:02	12:02, 12
13	13, 13:01, 13:02, 13:03
13:01	13:01, 13
13:02	13:02, 13
13:03	13:03, 13
14	14, 14:01, 14:02, 14:03, 14:04, 14:05, 14:06, 14:54
14:01	14:01, 14, 14:54
14:02	14:02, 14
14:03	14:03, 14
14:04	14:04, 14
14:05	14:05, 14
14:06	14:06, 14
14:54	14:54, 14, 14:01
15	15, 15:01, 15:02, 15:03
15:01	15:01, 15
15:02	15:02, 15
15:03	15:03, 15
16	16, 16:01, 16:02
16:01	16:01, 16
16:02	16:02, 16
17	17, 03:01
18	18, 03:02

15 *Tables 4-5, 4-6, 4-7, 4-8, 4-9, 4-10, 4-11, 4-12,* and *4-13*, and *4-14* show candidate-donor unacceptable
16 antigen combinations. For each candidate antigen, the donor antigens that are unacceptable are listed
17 below. Table 4-14 4-15 shows additional unacceptable antigen equivalences to be used in the Calculated
18 Panel Reactive Antibody (CPRA) only.
19
20 Examples of how "Unacceptable Antigen Equivalences" works:
21 If a candidate has B70 listed as an "unacceptable antigen", donors typed as B70, B71, B72, 15:03, or
22 15:10, or 15:18 are considered unacceptable.

23

24 **Table 4-5: HLA A Unacceptable Antigen Equivalences**

Candidate Unacceptable A-Locus Antigen	Donor Equivalent Antigens
1	1, 01:01, 01:02
01:01	01:01
01:02	01:02
2	2, 02:01, 02:02, 02:03, 02:05, 02:06, 02:07, 02:10, 02:18
02:01	02:01
02:02	02:02
02:03	02:03
02:05	02:05
02:06	02:06
02:07	02:07
02:10	02:10
02:18	02:18
3	3, 03:01, 03:02, 32:04
03:01	03:01
03:02	03:02
9	9, 23, 24, 24:02, 24:03
10	10, 25, 26, 26:01, 26:02, 26:03, 34, 34:01, 34:02, 66, 66:01, 66:02, 43
11	11, 11:01, 11:02
11:01	11:01
11:02	11:02
19	19, 29, 29:01, 29:02, 30, 30:01, 30:02, 31, 32, 33, 33:01, 33:03, 74
23	23
24	24, 24:02, 24:03
24:02	24:02
24:03	24:03
25	25
26	26, 26:01, 26:02, 26:03
26:01	26:01
26:02	26:02
26:03	26:03
28	28, 68, 69, 68:01, 68:02
29	29, 29:01, 29:02
29:01	29:01
29:02	29:02
30	30, 30:01, 30:02
30:01	30:01
30:02	30:02
31	31
32	32
32:04	32:04
33	33, 33:01, 33:03

Candidate Unacceptable A-Locus Antigen	Donor Equivalent Antigens
33:01	33:01
33:03	33:03
34	34, 34:01, 34:02
34:01	34:01
34:02	34:02
36	36
43	43
66	66, 66:01, 66:02
66:01	66:01
66:02	66:02
68	68, 68:01, 68:02
68:01	68:01
68:02	68:02
69	69
74	74
80	80

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Table 4-6 HLA B Unacceptable Antigen Equivalences

Candidate Unacceptable B-Locus Antigen	Donor Equivalent Antigens
5	5, 51, 51:01, 51:02, 52
7	7, 07:02, 07:14
07:02	07:02
07:14	07:14
8	8, 08:01, 08:02, 08:03, 08:04
08:01	08:01
08:02	08:02
08:03	08:03
08:04	08:04
12	12, 44, 44:02, 44:03, 4415, 45
13	13, 13:01, 13:02
13:01	13:01
13:02	13:02
14	14, 64, 65, 14:01, 14:02
14:01	14:01, 64
14:02	14:02, 65
15	15, 62, 63, 70, 71, 72, 75, 76, 77, 15:01, 15:02, 15:03, 15:04, 15:06, 15:07, 15:10, 15:11, 15:12, 15:13, 15:16, 15:17, 15:18, 15:20, 15:21, 15:24, 15:27
15:01	15:01
15:02	15:02
15:03	15:03
15:04	15:04
15:06	15:06

Candidate Unacceptable B-Locus Antigen	Donor Equivalent Antigens
15:07	15:07
15:10	15:10
15:11	15:11
15:12	15:12
15:13	15:13
15:16	15:16
15:17	15:17
15:18	15:18
15:20	15:20
15:21	15:21
15:24	15:24
15:27	15:27
16	16, 38, 39, 39:01, 39:02, 39:04, 39:05, 39:06, 39:13
17	17, 57, 57:01, 57:03, 58
18	18
21	21, 49, 50, 40:05
22	22, 54, 55, 55:01, 55:02, 55:04, 56, 56:01, 56:03
27	27, 27:04, 27:05, 27:06, 27:08
27:04	27:04
27:05	27:05
27:06	27:06
27:08	27:08
35	35, 35:01, 35:02, 35:03, 35:08, 35:12
35:01	35:01
35:02	35:02
35:03	35:03
35:08	35:08
35:12	35:12
37	37
38	38, 38:01, 38:02
38:01	38:01
38:02	38:02
39	39, 39:01, 39:02, 39:04, 39:05, 39:06, 39:13
39:01	39:01
39:02	39:02
39:04	39:04
39:05	39:05
39:06	39:06
39:13	39:13
40	40, 60, 61, 40:01, 40:02, 40:03, 40:04, 40:06
40:01	40:01, 60
40:02	40:02
40:03	40:03
40:04	40:04

Candidate Unacceptable B-Locus Antigen	Donor Equivalent Antigens
40:05	40:05, 50
40:06	40:06
41	41, 41:01, 41:02
41:01	41:01
41:02	41:02
42	42, 42:01, 42:02
42:01	42:01
42:02	42:02
44	44, 44:02, 44:03
44:02	44:02
44:03	44:03
~~4415~~	~~4415, 45~~
45	45, ~~4415,~~ 50:02
46	46
47	47
48	48, 48:01, 48:02
48:01	48:01
48:02	48:02
49	49
50	50, 40:05
51	51, 51:01, 51:02
51:01	51:01
51:02	51:02
52	52
53	53
54	54
55	55, 55:01, 55:02, 55:04
55:01	55:01
55:02	55:02
55:04	55:04
56	56, 56:01, 56:03
56:01	56:01
56:03	56:03
57	57, 57:01, 57:03
57:01	57:01
57:03	57:03
58	58
59	59
60	60, 40:01
61	61, 40:02, 40:03, 40:04, 40:06
62	62, 15:01, 15:04, 15:06, 15:07, 15:20, 15:27
63	63, 15:16, 15:17
64	64, 14:01
65	65, 14:02

Candidate Unacceptable B-Locus Antigen	Donor Equivalent Antigens
67	67
70	70, 71, 72, 15:03, 15:10, 15:18
71	71, 15:10, 15:18
72	72, 15:03
73	73
75	75, 15:02, 15:11, 15:21
76	76, 15:12
77	77, 15:13
78	78
81	81
82	82
Bw4	Bw4, 08:02, 08:03, 08:04, 5, 13, 13:01, 13:02, 15:13, 15:16, 15:17, 15:24,17, 27, 27:04, 27:05, 27:06, 37, 38, 38:01, 38:02, 44, 44:02, 44:03, 4415, 47, 49, 51, 51:01, 51:02, 52, 53, 57, 57:01, 57:03, 58, 59, 63, 77
Bw6	Bw6, 7, 07:02, 07:14, 8, 08:01, 14, 14:01, 14:02,15:01, 15:02, 15:03, 15:04, 15:06, 15:07, 15:10, 15:11,15:12, 15:18, 15:20. 15:21, 15:27, 18, 22, 27:08, 35, 35:01, 35:02, 35:03, 35:08, 35:12, 39, 39:01, 39:02, 39:04, 39:05, 39:06, 39:13, 40, 40:01, 40:02, 40:03, 40:04, 40:05, 40:06, 41, 41:01, 41:02, 42, 42:01, 42:02, 45, 48, 48:01 48:02, 50, 50:01, 50:02, 54, 55, 55:01, 55:02, 55:04, 56, 56:01, 56:03, 60, 61, 62, 64, 65, 67, 70, 71, 72, 75, 76, 78, 81, 82

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Table 4-7: HLA C Unacceptable Antigen Equivalences

Candidate Unacceptable C-Locus Antigen	Donor Equivalent Antigens
01	01, 01:02, 01:03
01:02	01:02
01:03	01:03
02	02, 02:02, 02:10
02:02	02:02
02:10	02:10
03	03, 09, 10
04	04, 04:01, 04:03
04:01	04:01
04:03	04:03
05	05
06	06
07	07, 07:01, 07:02, 07:04
07:01	07:01
07:02	07:02
07:04	07:04
08	08, 08:01, 08:02, 08:03, 08:04
08:01	08:01
08:02	08:02

Candidate Unacceptable C-Locus Antigen	Donor Equivalent Antigens
08:03	08:03
08:04	08:04
09	09
10	10
12	12, 12:02, 12:03
12:02	12:02
12:03	12:03
14	14, 14:02, 14:03
14:02	14:02
14:03	14:03
15	15, 15:02, 15:05
15:02	15:02
15:05	15:05
16	16, 16:01, 16:02
16:01	16:01
16:02	16:02
17	17, 17:01, 17:03
17:01	17:01
17:03	17:03
18	18, 18:01, 18:02
18:01	18:01
18:02	18:02

29
30

Table 4-8: HLA DR Unacceptable Antigen Equivalences

Candidate Unacceptable DR Locus Antigen	Donor Equivalent Antigens
1	1, 01:01, 01:02, 01:03
01:01	01:01
01:02	01:02
01:03	01:03
103	103
2	2, 15, 15:01, 15:02, 15:03, 16, 16:01, 16:02
3	3, 17, 18, 03:01, 03:02, 03:03
03:01	03:01, 17
03:02	03:02, 18
03:03	03:03, 18
4	4, 04:01, 04:02, 04:03, 04:04, 04:05, 04:06, 04:07, 04:10, 04:11
04:01	04:01
04:02	04:02
04:03	04:03
04:04	04:04
04:05	04:05
04:06	04:06
04:07	04:07
04:10	04:10

Candidate Unacceptable DR Locus Antigen	Donor Equivalent Antigens
04:11	04:11
5	5, 11, 11:01, 11:04, 12, 12:01, 12:02
6	6, 13, 13:01, 13:02, 13:03, 14, 14:01, 14:02, 14:03, 14:04, 14:05, 14:06, 14:54
7	7
8	8, 08:01, 08:02, 08:03, 08:07
08:01	08:01
08:02	08:02
08:03	08:03
08:07	08:07
9	9, 09:01, 09:02
09:01	09:01
09:02	09:02
10	10
11	11, 11:01, 11:03, 11:04
11:01	11:01
11:03	11:03
11:04	11:04
12	12, 12:01, 12:02
12:01	12:01
12:02	12:02
13	13, 13:01, 13:02,13:03, 13:05
13:01	13:01
13:02	13:02
13:03	13:03
13:05	13:05
14	14, 14:01, 14:02, 14:03, 14:04,14:05, 14:06 14:54
14:01	14:01
14:02	14:02
14:03	14:03
14:04	14:04
14:05	14:05
14:06	14:06
14:54	14:54
15	15, 15:01, 15:02, 15:03
15:01	15:01
15:02	15:02
15:03	15:03
16	16, 16:01, 16:02
16:01	16:01
16:02	16:02
17	17, 03:01
18	18, 03:02

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Table 4-9: HLA DR51 Unacceptable Antigen Equivalences

Candidate Unacceptable DR51-Locus Antigen	Donor Equivalent Antigens
5*01	5*01
5*01:01	5*01:01
5*01:02	5*01:02
5*02	5*02
5*02:02	5*02:02
51	51, 5*01:01, 5*01:02, 5*02:02, 5*01, 5*02

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34

Table 4-10: HLA DR52 Unacceptable Antigen Equivalences

Candidate Unacceptable DR52-Locus Antigen	Donor Equivalent Antigens
3*01	3*01
3*01:01	3*01:01
3*02	3*02
3*02:01	3*02:01
3*02:02	3*02:02
3*03	3*03
3*03:01	3*03:01
52	52, 3*01:01, 3*02:01, 3*02:02, 3*03:01, 3*01, 3*02, 3*03

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Table 4-11: HLA DR53 Unacceptable Antigen Equivalences

Candidate Unacceptable DR-53 Locus Antigen	Donor Equivalent Antigens
4*01	4*01
4*01:01	4*01:01
4*01:03	4*01:03
53	53, 4*01:01, 4*01:03, 4*01

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38

Table 4-12: HLA DQA1 Unacceptable Antigen Equivalences

Candidate's Unacceptable DQA1 Locus Antigen	Donor Equivalent Antigens
01	01, 01:01, 01:02, 01:03, 01:04, 01:05, 01:06, 01:07, 01:08, 01:09, 01:10, 01:11, 01:12
01:01	01:01
01:02	01:02
01:03	01:03
01:04	01:04
01:05	01:05
01:06	01:06
01:07	01:07
01:08	01:08
01:09	01:09
01:10	01:10

Candidate's Unacceptable DQA1 Locus Antigen	Donor Equivalent Antigens
01:11	01:11
01:12	01:12
02	02, 02:01
02:01	02:01
03	03, 03:01, 03:02, 03:03
03:01	03:01
03:02	03:02
03:03	03:03
04	04, 04:01, 04:02, 04:04
04:01	04:01
04:02	04:02
04:04	04:04
05	05, 05:01, 05:02, 05:03, 05:04, 05:05, 05:06, 05:07, 05:08, 05:09, 05:10, 05:11
05:01	05:01
05:02	05:02
05:03	05:03
05:04	05:04
05:05	05:05
05:06	05:06
05:07	05:07
05:08	05:08
05:09	05:09
05:10	05:10
05:11	05:11
06	06, 06:01, 06:02
06:01	06:01
06:02	06:02

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Table 4-13: HLA DQB1 Unacceptable Antigen Equivalences

Candidate Unacceptable DQB1 Locus Antigen	Donor Equivalent Antigens
1	1, 5, 6, 05:01, 05:02, 06:01, 06:02, 06:03, 06:04, 06:09
2	2, 02:01, 02:02
02:01	02:01
02:02	02:02
3	3, 7, 8, 9, 03:01, 03:02, 03:03, 03:19
03:01	03:01, 7
03:02	03:02, 8
03:03	03:03, 9

Candidate Unacceptable DQB1 Locus Antigen	Donor Equivalent Antigens
03:19	03:19, 7
4	4, 04:01, 04:02
04:01	04:01
04:02	04:02
5	5, 05:01, 05:02, 05:03
05:01	05:01
05:02	05:02
05:03	05:03
6	6, 06:01, 06:02, 06:03, 06:04, 06:09
06:01	06:01
06:02	06:02
06:03	06:03
06:04	06:04
06:09	06:09
7	7, 3, 03:01, 03:19
8	8, 3, 03:02
9	9, 3, 03:03

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Table 4-14: HLA DPB1 Unacceptable Antigen Equivalences

Candidate Unacceptable DPB1 Locus Antigen	Donor Equivalent Antigen
01:01	01:01, 162:01, 417:01, 462:01, 636:01
02:01	02:01,141:01, 352:01, 414:01, 416:01, 461:01, 617:01, 640:01
02:02	02:02, 547:01
03:01	03:01, 104:01, 124:01, 351:01
04:01	04:01, 126:01, 350:01, 415:01, 459:01, 464:01, 534:01, 615:01, 618:01
04:02	04:02, 105:01, 463:01, 571:01, 647:01
05:01	05:01, 135:01
06:01	06:01
08:01	08:01
09:01	09:01
10:01	10:01
11:01	11:01
13:01	13:01, 107:01, 133:01, 518:01, 519:01
14:01	14:01, 498:01, 572:01
15:01	15:01, 585:01
16:01	16:01
17:01	17:01, 131:01, 168:01, 460:01
18:01	18:01
19:01	19:01, 106:01, 533:01, 535:01

Candidate Unacceptable DPB1 Locus Antigen	Donor Equivalent Antigen
20:01	20:01
21:01	21:01
22:01	22:01
23:01	23:01, 138:01
24:01	24:01
25:01	25:01
26:01	26:01
27:01	27:01
28:01	28:01, 296:01
29:01	29:01
30:01	30:01
31:01	31:01
32:01	32:01
33:01	33:01
34:01	34:01
35:01	35:01
36:01	36:01
37:01	37:01
38:01	38:01
39:01	39:01, 584:01
40:01	40:01
41:01	41:01
44:01	44:01
45:01	45:01
46:01	46:01
47:01	47:01
48:01	48:01
49:01	49:01
50:01	50:01
51:01	51:01
52:01	52:01
53:01	53:01
54:01	54:01
55:01	55:01
56:01	56:01
57:01	57:01, 648:01
58:01	58:01
59:01	59:01

Candidate Unacceptable DPB1 Locus Antigen	Donor Equivalent Antigen
60:01	60:01
62:01	62:01
63:01	63:01
65:01	65:01
66:01	66:01
67:01	67:01
68:01	68:01
69:01	69:01
70:01	70:01
71:01	71:01
72:01	72:01
73:01	73:01
74:01	74:01
75:01	75:01
76:01	76:01
77:01	77:01
78:01	78:01
79:01	79:01
80:01	80:01
81:01	81:01
82:01	82:01
83:01	83:01
84:01	84:01
85:01	85:01
86:01	86:01
87:01	87:01
88:01	88:01
89:01	89:01
90:01	90:01
91:01	91:01
92:01	92:01
93:01	93:01
94:01	94:01
95:01	95:01
96:01	96:01
97:01	97:01
98:01	98:01
99:01	99:01

Candidate Unacceptable DPB1 Locus Antigen	Donor Equivalent Antigen
100:01	100:01
101:01	101:01
102:01	102:01
103:01	103:01
104:01	104:01
105:01	105:01
106:01	106:01
107:01	107:01
108:01	108:01
109:01	109:01
110:01	110:01
111:01	111:01
112:01	112:01
113:01	113:01
114:01	114:01
115:01	115:01
116:01	116:01
117:01	117:01
118:01	118:01
119:01	119:01
121:01	121:01
122:01	122:01
123:01	123:01
124:01	124:01
125:01	125:01
126:01	126:01
127:01	127:01
128:01	128:01
129:01	129:01
130:01	130:01
131:01	131:01
132:01	132:01
133:01	133:01
134:01	134:01
135:01	135:01
136:01	136:01
137:01	137:01
138:01	138:01

Candidate Unacceptable DPB1 Locus Antigen	Donor Equivalent Antigen
139:01	139:01
140:01	140:01
141:01	141:01
142:01	142:01
143:01	143:01
144:01	144:01
145:01	145:01
146:01	146:01
147:01	147:01
148:01	148:01
149:01	149:01
150:01	150:01
151:01	151:01
152:01	152:01
153:01	153:01
155:01	155:01
156:01	156:01
157:01	157:01
158:01	158:01
160:01	160:01
162:01	162:01
163:01	163:01
164:01	164:01
165:01	165:01
166:01	166:01
167:01	167:01
168:01	168:01
169:01	169:01
170:01	170:01
171:01	171:01
172:01	172:01
173:01	173:01
174:01	174:01
175:01	175:01
176:01	176:01
177:01	177:01
178:01	178:01
179:01	179:01

Candidate Unacceptable DPB1 Locus Antigen	Donor Equivalent Antigen
180:01	180:01
181:01	181:01
182:01	182:01
183:01	183:01
184:01	184:01
185:01	185:01
186:01	186:01
187:01	187:01
188:01	188:01
189:01	189:01
190:01	190:01
191:01	191:01
192:01	192:01
193:01	193:01
194:01	194:01
195:01	195:01
196:01	196:01
197:01	197:01
198:01	198:01
199:01	199:01
200:01	200:01
201:01	201:01
202:01	202:01
203:01	203:01
204:01	204:01
205:01	205:01
206:01	206:01
207:01	207:01
208:01	208:01
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210:01	210:01
211:01	211:01
212:01	212:01
213:01	213:01
214:01	214:01
215:01	215:01
217:01	217:01
219:01	219:01

Candidate Unacceptable DPB1 Locus Antigen	Donor Equivalent Antigen
220:01	220:01
221:01	221:01
222:01	222:01
223:01	223:01
224:01	224:01
225:01	225:01
226:01	226:01
227:01	227:01
228:01	228:01
229:01	229:01
230:01	230:01
231:01	231:01
232:01	232:01
233:01	233:01
234:01	234:01
235:01	235:01
236:01	236:01
237:01	237:01
238:01	238:01
239:01	239:01
240:01	240:01
241:01	241:01
242:01	242:01
243:01	243:01
244:01	244:01
245:01	245:01
246:01	246:01
247:01	247:01
248:01	248:01
249:01	249:01
250:01	250:01
251:01	251:01
252:01	252:01
253:01	253:01
254:01	254:01
255:01	255:01
256:01	256:01
257:01	257:01

Candidate Unacceptable DPB1 Locus Antigen	Donor Equivalent Antigen
258:01	258:01
259:01	259:01
260:01	260:01
261:01	261:01
262:01	262:01
263:01	263:01
264:01	264:01
265:01	265:01
266:01	266:01
267:01	267:01
268:01	268:01
269:01	269:01
270:01	270:01
271:01	271:01
272:01	272:01
273:01	273:01
274:01	274:01
275:01	275:01
276:01	276:01
277:01	277:01
278:01	278:01
279:01	279:01
280:01	280:01
281:01	281:01
282:01	282:01
283:01	283:01
284:01	284:01
285:01	285:01
286:01	286:01
287:01	287:01
288:01	288:01
289:01	289:01
290:01	290:01
291:01	291:01
292:01	292:01
293:01	293:01
294:01	294:01
295:01	295:01

Candidate Unacceptable DPB1 Locus Antigen	Donor Equivalent Antigen
296:01	296:01
297:01	297:01
298:01	298:01
299:01	299:01
300:01	300:01
301:01	301:01
302:01	302:01
303:01	303:01
304:01	304:01
305:01	305:01
306:01	306:01
307:01	307:01
308:01	308:01
309:01	309:01
310:01	310:01
311:01	311:01
312:01	312:01
313:01	313:01
314:01	314:01
315:01	315:01
316:01	316:01
317:01	317:01
318:01	318:01
319:01	319:01
320:01	320:01
321:01	321:01
322:01	322:01
323:01	323:01
324:01	324:01
325:01	325:01
326:01	326:01
327:01	327:01
329:01	329:01
330:01	330:01
331:01	331:01
332:01	332:01
333:01	333:01
334:01	334:01

Candidate Unacceptable DPB1 Locus Antigen	Donor Equivalent Antigen
335:01	335:01
336:01	336:01
337:01	337:01
338:01	338:01
339:01	339:01
340:01	340:01
341:01	341:01
342:01	342:01
343:01	343:01
344:01	344:01
345:01	345:01
346:01	346:01
347:01	347:01
348:01	348:01
349:01	349:01
350:01	350:01
351:01	351:01
352:01	352:01
353:01	353:01
354:01	354:01
355:01	355:01
356:01	356:01
358:01	358:01
359:01	359:01
360:01	360:01
361:01	361:01
362:01	362:01
363:01	363:01
364:01	364:01
365:01	365:01
366:01	366:01
367:01	367:01
368:01	368:01
369:01	369:01
370:01	370:01
371:01	371:01
372:01	372:01
373:01	373:01

Candidate Unacceptable DPB1 Locus Antigen	Donor Equivalent Antigen
374:01	374:01
375:01	375:01
376:01	376:01
377:01	377:01
378:01	378:01
379:01	379:01
380:01	380:01
381:01	381:01
383:01	383:01
384:01	384:01
385:01	385:01
386:01	386:01
387:01	387:01
388:01	388:01
389:01	389:01
390:01	390:01
391:01	391:01
392:01	392:01
393:01	393:01
394:01	394:01
395:01	395:01
396:01	396:01
397:01	397:01
398:01	398:01
399:01	399:01
400:01	400:01
402:01	402:01
404:01	404:01
405:01	405:01
406:01	406:01
407:01	407:01
408:01	408:01
409:01	409:01
410:01	410:01
411:01	411:01
412:01	412:01
413:01	413:01
414:01	414:01

Candidate Unacceptable DPB1 Locus Antigen	Donor Equivalent Antigen
415:01	415:01
416:01	416:01
417:01	417:01
418:01	418:01
419:01	419:01
420:01	420:01
421:01	421:01
422:01	422:01
423:01	423:01
424:01	424:01
425:01	425:01
426:01	426:01
427:01	427:01
428:01	428:01
429:01	429:01
430:01	430:01
431:01	431:01
432:01	432:01
433:01	433:01
434:01	434:01
435:01	435:01
436:01	436:01
437:01	437:01
438:01	438:01
439:01	439:01
459:01	459:01
460:01	460:01
461:01	461:01
462:01	462:01
463:01	463:01
464:01	464:01
498:01	498:01
518:01	518:01
519:01	519:01
533:01	533:01
534:01	534:01
535:01	535:01
547:01	547:01

Candidate Unacceptable DPB1 Locus Antigen	Donor Equivalent Antigen
571:01	571:01
572:01	572:01
584:01	584:01
585:01	585:01
615:01	615:01
617:01	617:01
618:01	618:01
636:01	636:01
640:01	640:01
647:01	647:01
648:01	648:01

43

44

45   **Table 4-14 4-15: Additional Unacceptable Antigen Equivalences to be used in the Calculated Panel Reactive**
46   **Antibody (CPRA) Only**

Locus	Patient Unacceptable Antigen	Unaccetable DR antigen equivalences used for CPRA calculation
DR51	5*01:01	2, 15, 16
	5*01:02	2, 15, 16
	5*02:02	2, 15, 16
	51	2, 15, 16
DR52	3*01:01	3, 5, 6, 11, 12, 13, 14, 17, 18
	3*02:01	3, 5, 6, 11, 12, 13, 14, 17, 18
	3*02:02	3, 5, 6, 11, 12, 13, 14, 17, 18
	3*03:01	3, 5, 6, 11, 12, 13, 14, 17, 18
	52	3, 5, 6, 11, 12, 13, 14, 17, 18
DR53	4*01:01	4, 7, 9
	4*01:03	4, 7, 9
	53	4, 7, 9